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TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.
FIS920010151US1

In Reply, Application Of:

Anderson et al.

| Serial No. | Filing Date | Examiner | Group Art Unit |
|------------|-------------------|-----------------|----------------|
| 09/992,344 | November 14, 2001 | Sefer, Ahmed N. | 2826 |

Invention: FUSE STRUCTURE AND METHOD TO FORM THE SAME

TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on

The fee for filing this Appeal Brief is: \$330.00

- ☐ A check in the amount of the fee is enclosed.
- ☒ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 09-0458

Signature

Dated:

11/26/03

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I certify that this document and fee is being deposited on 11/26/03 with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature of Person Mailing Correspondence

Frederick W. Gibb, III

Typed or Printed Name of Person Mailing Correspondence

CC:



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES**

In re patent application of

Anderson et al.

Serial No.: 09/992,344

Group Art Unit: 2826

Filed: November 14, 2001

Examiner: Sefer, Ahmed N.

For: FUSE STRUCTURE AND METHOD TO FORM THE SAME

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' APPEAL BRIEF

Sirs:

Appellants respectfully appeal the final rejection of claims 1-4, 6-22, 25 and 28-30 in the Office Action dated June 27, 2003. A Notice of Appeal was timely filed on September 26, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corp., Armonk, New York, assignee of 100% interest of the above-referenced patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-4, 6-22, 25 and 28-30 are all the claims pending in the application and are set forth fully in the attached appendix. Claims 1-20 were originally filed in the application. Appellants elected claims 1-10 in a Response to Restriction Requirement filed on May 8, 2002. Appellants cancelled claims 11-20 and added new claims 21-30 in an Amendment filed on September 5, 2002. Claims 5, 23, 24, 26, and 27 were cancelled by Appellants in an Amendment filed on April 15, 2003.

Claims 1, 6-8, 10, 21, 22, 25, 28 and 29 stand rejected under 35 U.S.C. §102(b) as being anticipated by Nozick (FR 2 575 864); and claims 2-4, 9 and 30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Nozick in view of Clinton et al. hereinafter "Clinton" (6,055,150).

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An after-final Response that made no claim amendments was filed on August 15, 2003. An Advisory Action dated September 4, 2003 indicated that, upon filing an appeal, the Response filed on August 15, 2003 did not place the application in condition for allowance, and that the rejections of claims 1-4, 6-22, 25 and 28-30 would remain. Appellants sent a facsimile to Examiner Ahmed Sefer on September 23, 2003 which included an English translation of portions of Nozick (and a copy of the same is attached hereto). The claims shown in the appendix are shown in their amended form as of the April 15, 2003 Amendment.

V. SUMMARY OF THE INVENTION

The claimed invention comprises a conductive inverse-U-shaped fuse, a portion of which is position external to the insulator. The structure is clearly illustrated in Appellants' Figure 1 where the fuse element 130 includes horizontal fuse element 140 with a pair of fuse electrodes 150, 151 extending downward from the horizontal fuse element 140 into the insulator layer 115. This structure allows the fuse to be blown by

applying a laser or exterior etching (or electrical current). When the fuse blows, the fuse debris material remains outside the insulator layer, thereby preventing any fuse debris contamination.

The claims define this structure very clearly. For example, independent claim 1 defines an "inverse-U shaped fuse extending through said insulator layer . . . wherein a portion of said fuse is positioned external to said insulator . . . and wherein said fuse comprises a continuous conductive element." The main applied prior art reference (Nozick) only teaches the use of a U-shaped insulator that melts to activate a short circuit and does not teach or suggest the claimed U-shape fuse element that comprises a "continuous conductive element", and Clinton also does not teach or suggest any type of U-shaped element.

VI. ISSUES PRESENTED FOR REVIEW

The issues presented for review by the Board of Patents Appeals and Interferences are whether claims 1, 6-8, 10, 21, 22, 25, 28 and 29 are anticipated under 35 U.S.C. §102(b) by Nozick; and whether claims 2-4, 9 and 30 are obvious under 35 U.S.C. §103(a) over Nozick in view of Clinton

VII. GROUPING OF THE CLAIMS

As supported by the following arguments, the claims are each independently patentable and do not stand or fall together. More specifically, the dependent claims are patently distinct from the independent claims from which they depend because each dependent claim defines additional features which are not defined in the independent claims or which are defined more broadly in the independent claims. As discussed in greater detail below, the features defined by the dependent claims are not merely illustrations or examples but include patentable features which prevent the dependent claims from standing or falling with their associated independent claim.

VIII. ARGUMENT

A. The Prior Art Rejections

1. The Rejection Based on Nozick

a. The Position in the Office Action

With respect to claims 1, 6, 7, and 21, the Office Action states the following:

Nozick discloses in fig. 2 a fuse structure comprising an insulator layer 1 or comprising an interface wall wherein said interface wall further comprises a first side wall 71, a second side wall 72, and an inner wall (unnumbered), wherein said inner wall is disposed within a gap (as in claim 7); an inverse-U shaped fuse extending through said insulator layer to an underlying wire layer; wherein a portion of said fuse surrounded by air (as in claim 21) is positioned external to said insulator or perpendicular to and above said insulator layer (as in claim 6), with a gap juxtaposed between said insulator and said portion of said fuse and wherein said fuse comprises a continuous conductive element.

With respect to claims 8, 10 and 22, the Office Action states the following:

Nozick discloses in fig. 2 a fuse structure comprising an insulator layer 1 or comprising an interface wall wherein said interface wall further comprises a first side wall 71, a second side wall 72, and an inner wall (as in claim 10); an inverse-U shaped fuse extending through said insulator layer to an underlying wire layer; wherein a portion of said fuse is positioned external to said insulator, wherein said portion of said fuse is perpendicular to and above said insulator layer or surrounded by air (as in claim 22); and wherein said fuse comprises a continuous conductive element.

With respect to claims 25, 28 and 29, the Office Action states the following:

Nozick discloses in fig. 2 an integrated circuit structure comprising a wiring layer having wiring elements 2 and 3; an insulator layer 1 covering said wiring layer; an inverse-U shaped

fuse extending completely through said insulator layer and being connected to said wiring elements; wherein said insulator forms an external surface of said integrated circuit structure and a portion of said fuse extends beyond said external surface, and wherein said fuse comprises a continuous conductive element.

As to claim 28, Nozick discloses in fig. 2 said fuse forming a circuit with said elements.

As to claim 29, Nozick discloses wiring elements internal to integrated circuit structure and separated from an external portion of said integrated circuit structure by said insulator layer.

b. Appellants' Position

i. Independent Claims 1, 8, and 25

Appellants respectfully submit that Nozick does not anticipate the claimed invention because, among other reasons, the claimed invention defines that the inverse-U shaped "fuse comprises a continuous conductive element." To the contrary, the U-shaped structure 7 shown in Figure 2 of Nozick is an insulator.

More specifically, the English-language portion of Nozick states that "The insulating wedge of material formed as a U-shape has one branch of the U under each elastic arm. This keeps the ends (62', 63') of the arms away from the line terminals normally." The remaining portion of the English-language description also clearly describes that item 7 is an insulator.

The first paragraph of the English-language Abstract describes that an elastic element 6 (Figure 1 of Nozick) is connected to a conductor 2 and is initially separated from conductors 3 and 4. Figure 1 appears to be a side-view and Figure 2 appears to be a top-view (or vice versa). This can be seen where item 62 is shown in cross-section in Figure 1 and is shown in top-view in Figure 2. While the H-shaped items in Figure 1 are not identified, by observing Figure 2, the H-shaped items are clearly cross-section portions of the U-shaped structures 7. More specifically, the H-shaped items in Figure 1 are positioned below the elastic portion 62. The same portions are shown from the different perspective as items 71' and 72' in Figure 2. Therefore, Appellants submit that

the relative positions of the structures shown in Figures 1 and 2 demonstrate that the H-shaped items in Figure 1 are portions of the U-shaped structure shown in Figure 2.

As described in the last paragraph of the English-language abstract, when there is an over-voltage condition, the insulating wedge melts allowing the arms 62, 63 to move down and provide a short circuit of element 2 to the conductors 3, 4. As described above, the relative positions of the structure shown in Figures 1 and 2 demonstrate that the H-shaped items in Figure 1 are portions of the U-shaped structure shown in Figure 2. Since it is the H-shaped structures that must melt to allow the ends of members 6 to contact conductors 3 and 4, the U-shaped structure 7 must be the U-shaped insulating wedge described in the English-language abstract.

This is directly contrary to the invention defined by independent claims 1, 8, and 25. More specifically, independent claims 1, 8, and 25 each define "an inverse-U shaped fuse . . . wherein said fuse comprises a continuous conductive element." In Nozick the element 7 is designed to melt and create a short-circuit when an over-voltage condition exists (see English-language abstract). The invention is directly contrary to such a structure. Instead, the claimed invention includes a conductive fuse that is designed to melt and prevent an electrical connection when an over-voltage condition exists. Therefore, Appellants submit that Nozick actually teaches away from the claimed invention because Nozick teaches that the exact opposite reactions should occur during a certain set of conditions when compared to the reaction created by the invention. Therefore, one ordinarily skilled in the art would not have made reference to the teachings in Nozick when designing a fuse that breaks a circuit. Instead, only those interested in forming short circuits would have made reference to Nozick. Thus, Appellants submit that not only does Nozick not teach each and every element of the claimed invention as defined by independent claims 1, 8, and 25 (as required by 35 U.S.C. § 102) but further that Nozick would not have been referred to by one ordinarily skilled in the art because Nozick teaches away from the invention.

Thus, the U shape that is referred to in the Office Action is actually made of an insulator. Nozick does not disclose a metal fuse, rather, Nozick discloses melting an insulator supporting an "elastic element" 6 that will provide a short-circuit when an over voltage occurs. The claimed invention uses a conductor that forms an open circuit when desired. Appellants further note that the air gap that is below the insulating element in

Nozick is far a field from the Appellants' invention in that Nozick does not disclose a conductive fuse element. Further, Nozick has three electrodes (2, 3, and 4), a U-shaped insulating material 7, and an elastic element 6. Appellants disagree that this can constitute an integrated circuit. Also, the air gap mentioned in the Office Action does not exist under the conductors in Nozick. Instead, there is only a gap below the U-shaped insulator and under the elastic element.

In view of the forgoing, Appellants respectfully submit that Nozick does not teach or suggest "an inverse-U shaped fuse . . . wherein said fuse comprises a continuous conductive element," as defined by independent claims 1, 8, and 25. Therefore, these claims are not anticipated by Nozick and are allowable. In view of the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

ii. **The Independent Patentability of
Dependent Claims 6, 8, 10, 21, 22, 28,
and 29**

The following discussion demonstrates that Nozick does not teach or suggest the invention defined by the dependent claims, but also that the dependent claims are independently patentable over their associated independent claims and do not stand or fall with their associated independent claims.

Dependent claim 6 defines that a portion of the fuse is perpendicular to and above the insulator layer. Nozick cannot teach the structure because, as explained above, the U-shaped structure is not a conductive fuse, but instead is an insulator. Thus, Nozick is incapable of teaching one ordinarily skilled in the art that a portion of the conductive fuse would be perpendicular to and above the insulator layer. Therefore, dependent claim 6 is independently patentable over Nozick because of the features defined and because of its dependency from independent claim 1.

Dependent claims 7 and 10 define the interface wall that exists in the gap between the fuse and insulator. Once again, it is Appellants position that Nozick cannot teach or suggest this structure because it does not include an inverse-U-shaped conductive fuse that can form such an interface wall, but instead only discloses a U-shaped insulating structure. Therefore, it is Appellants' position that dependent claims 7 and 10 are

independently patentable over Nozick because of the additional features of the invention they define.

Dependent claims 21 and 22 define that a portion of the fuse is surrounded by air. Once again, this feature is also independently patentable over Nozick principally because Nozick does not provide the teaching of an exterior conductive fuse element that utilizes a gap that is surrounded by air. Instead, Nozick only discloses an insulating U-shaped structure. Therefore, dependent claims 21 and 22 are similarly independently patentable in their own right.

Dependent claim 28 defines a fuse that forms a circuit with the wiring elements and dependent claim 29 defines that wiring elements are internal to the integrated circuit structure and are separated from an external portion of the integrated circuit structure by the insulator layer. These features demonstrate how the invention is even further distinguished from Nozick because the insulating U-shaped structure in Nozick can never be part of a "circuit" because it is not conductive. Instead, the insulating U-shaped structure disclosed in Nozick is merely a physical feature that melts when the structure reaches a sufficient temperature.

Thus, Nozick does not teach or suggest the invention defined by dependent claims 6, 7, 10, 21, 22, 28, and 29; and, dependent claims 6, 7, 10, 21, 22, 28, and 29, are patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view the forgoing, the Board is respectfully requested to reconsider and withdraw this rejection.

2. The Rejection Based on Nozick in view of Clinton

a. The Position in the Office Action

Regarding claims 2-4, 9, and 30, the Office Action states the following:

Nozick discloses the device structure as recited in the claims, but does not specifically disclose an electroplated and electroless fuse element.

Clinton et al disclose (see figs. 1-8, col. 6, lines 11-50 and col. 12, lines 45-67) an electroplated fuse element. Therefore, it would have been to one skilled in the art at the time the invention was made to use an electroplated fuse

element, since that would provide the required resistivity and melting point necessary for a better fuse function.

Regarding claims 3, 4 and 9, Clinton et al. disclose electroplated/electroless plated fuse element (as in claim 3) having a thickness, which falls within 100 angstroms to 350 angstroms (as in claim 4).

b. Appellants' Position

**i. The Independent Patentability of
Dependent Claims 2-4, 9 and 30**

Clinton is referenced for the limited purpose of showing an electroplated fuse element. However, Appellants submit that Clinton is not properly combinable with Nozick because electroplating the U-shaped insulator in Nozick would make the U-shaped element a conductor, which would destroy the operability and function that the insulating U-shaped element performs. In other words, if the U-shaped element 7 were a conductor, it would create an unintended short circuit, in that it was intended to be used as an insulator. When a combination of references destroys the operability and function of one of the references, one ordinarily skilled in the art would not have made the combination. Therefore, Appellants submit that a prima facie case of obviousness has not been set forth because the proposed combination of references destroys the operability and function of Nozick by changing the insulator into a conductor.

Further, Clinton is not in the same art field as the inventive structure because Clinton requires that the fuse element be positioned within the insulator, while the invention relates to external fuses. The teachings regarding electroplating fuse elements in Clinton would be irrelevant to the claimed invention which includes external fuse elements. Clinton requires that the "fuses 50 are positioned in hollow cavities in the insulator 30" (Abstract, lines 8-10). Therefore, Clinton explicitly requires that the fuse element be positioned within the insulator 30. The invention is fundamentally different than the structure shown in Clinton and has the fuse positioned external to the insulator.

In addition, as shown above, Nozick actually teaches away from the claimed invention by creating a short circuit. Also, the teaching of melting the insulator in Nozick would destroy the function of the structure in Clinton because it would cause

short circuits in the structure in Clinton. Thus, Appellants submit that there is no motivation in either reference toward teaching any combination to form the invention and that a prima facie case of obviousness has not been set forth.

More importantly, because Clinton requires that the fuse be internal to the circuit, it cannot teach or suggest the external, U-shape conductive fuse element defined by independent claims 1, 8, and 25. Therefore, any combination of Clinton and Nozick would not teach one ordinarily skilled in the art the claimed features of an "inverse-U shaped fuse . . . wherein said fuse comprises a continuous conductive element," as defined by independent claims 1, 8, and 25. Therefore, the independent claims in the application are patentable over the applied prior art of record.

In addition, dependent claims 2-4, 9, and 30 are patentable not only because they depend from a patentable independent claim, but also because of the additional features of the invention they define. More specifically, dependent claims 2, 3, 9, and 30 define that the fuse is plated (electroplated or electroless plated). Dependent claim 4 defines a specific size limitation of the invention. The only type of electroplating discussed in the prior art of record (Clinton) relates to internal fuse structures and not to the claimed external conductive fuse structure. Therefore, there is no teaching or suggestion in the prior of record of the claimed electroplated or electroless plating of external conductive fuse elements. Thus, dependent claims 2-4, 9, and 30 are independently patentable in their own right.

Therefore, Appellants respectfully traverse this rejection on the basis that a prima facie case of obviousness has not been set forth because the applied references are not properly combinable since the teachings are essentially unrelated. Further, the applied references do not teach or suggest the claimed invention. Since this rejection is defective, Appellants respectfully request that it be withdrawn and that dependent claims 2-4, 9 and 30 be passed to issue. In view the forgoing, the Board is respectfully requested to reconsider and withdraw this rejection.

IX. CONCLUSION

The claimed invention comprises a conductive inverse-U-shaped fuse, a portion of which is positioned external to the insulator. The structure is clearly illustrated in

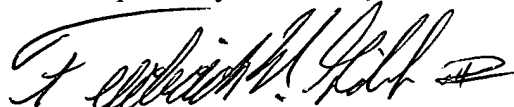
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Appeal Brief

Appellants' Figure 1 where the fuse element 130 includes horizontal fuse element 140 with a pair of fuse electrodes 150, 151 extending downward from the horizontal fuse element 140 into the insulator layer 115. This structure allows the fuse to be blown by applying a laser or exterior etching (or electrical current). When the fuse blows, the fuse debris material remains outside the insulator layer, thereby preventing any fuse debris contamination.

The claims define this structure very clearly. For example, independent claim 1 defines an "inverse-U shaped fuse extending through said insulator layer . . . wherein a portion of said fuse is positioned external to said insulator . . . and wherein said fuse comprises continue as conductive element." The main applied prior art reference (Nozick) only teaches the use of a U-shaped insulator that melts to create a short circuit and does not teach or suggest the claimed U-shape fuse element that comprises a "continuous conductive element", and Clinton also does not teach or suggest any type of U-shaped element.

In view the forgoing, the Board is respectfully requested to reconsider and withdraw the rejections. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0458.

Respectfully submitted,



Frederick W. Gibb, III
Registration No. 37,629

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APPENDIX

1. A fuse structure comprising:
an insulator layer; and
an inverse-U shaped fuse extending through said insulator layer to an underlying wiring layer,
wherein a portion of said fuse is positioned external to said insulator, with a gap juxtaposed between said insulator and said portion of said fuse, and
wherein said fuse comprises a continuous conductive element.
2. The fuse structure in claim 1, wherein said portion of said fuse is electroplated.
3. The fuse structure in claim 1, wherein said portion of said fuse is electroless plated.
4. The fuse structure in claim 1, wherein said fuse has a thickness in range of 100 angstroms to 350 angstroms.
5. (Cancelled).
6. The fuse structure in claim 1, wherein said portion of said fuse is perpendicular to and above said insulator layer.
7. The fuse structure in claim 1 further comprising an interface wall, wherein said interface wall further comprises a first side wall, a second side wall, and an inner wall, wherein said inner wall is disposed within said gap.
8. A fuse structure comprising:
an insulator layer; and
an inverse-U shaped fuse extending through said insulator layer to an underlying wiring layer,
wherein a portion of said fuse is positioned external to said insulator,

wherein said portion of said fuse is perpendicular to and above said insulator layer, and

wherein said fuse comprises a continuous conductive element.

9. The fuse structure of claim 8, wherein said portion of said fuse is one of electroplated and electroless plated.

10. The fuse structure in claim 8 further comprising an interface wall, wherein said interface wall further comprises a first side wall, a second side wall, and an inner wall.

11 - 20. (Cancelled).

21. The fuse structure in claim 1, wherein said portion of said fuse is surrounded by air.

22. The fuse structure in claim 8, wherein said portion of said fuse is surrounded by air.

23. (Cancelled).

24. (Cancelled).

25. An integrated circuit structure comprising:
a wiring layer having wiring elements;
an insulator layer covering said wiring layer; and
an inverse U-shaped fuse extending completely through said insulator layer and being connected to said wiring elements,

wherein said insulator layer forms an external surface of said integrated circuit structure and a portion of said fuse extends beyond said external surface, and

wherein said fuse comprises a continuous conductive element.

26. (Cancelled).

27. (Cancelled).

28. The integrated circuit structure in claim 25, wherein said fuse forms a circuit with said wiring elements.

29. The integrated circuit structure in claim 25, wherein said wiring elements are internal to said integrated circuit structure and are separated from an external portion of said integrated circuit structure by said insulator layer.

30. The integrated circuit structure in claim 25, wherein said portion of said fuse is plated.

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applying a laser or exterior etching (or electrical current). When the fuse blows, the fuse debris material remains outside the insulator layer, thereby preventing any fuse debris contamination.

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VIII. ARGUMENT

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With respect to claims 8, 10 and 22, the Office Action states the following:

Nozick discloses in fig. 2 a fuse structure comprising an insulator layer 1 or comprising an interface wall wherein said interface wall further comprises a first side wall 71, a second side wall 72, and an inner wall (as in claim 10); an inverse-U shaped fuse extending through said insulator layer to an underlying wire layer; wherein a portion of said fuse is positioned external to said insulator, wherein said portion of said fuse is perpendicular to and above said insulator layer or surrounded by air (as in claim 22); and wherein said fuse comprises a continuous conductive element.

With respect to claims 25, 28 and 29, the Office Action states the following:

Nozick discloses in fig. 2 an integrated circuit structure comprising a wiring layer having wiring elements 2 and 3; an insulator layer 1 covering said wiring layer; an inverse-U shaped

fuse extending completely through said insulator layer and being connected to said wiring elements; wherein said insulator forms an external surface of said integrated circuit structure and a portion of said fuse extends beyond said external surface, and wherein said fuse comprises a continuous conductive element.

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i. Independent Claims 1, 8, and 25

Appellants respectfully submit that Nozick does not anticipate the claimed invention because, among other reasons, the claimed invention defines that the inverse-U shaped "fuse comprises a continuous conductive element." To the contrary, the U-shaped structure 7 shown in Figure 2 of Nozick is an insulator.

More specifically, the English-language portion of Nozick states that "The insulating wedge of material formed as a U-shape has one branch of the U under each elastic arm. This keeps the ends (62', 63') of the arms away from the line terminals normally." The remaining portion of the English-language description also clearly describes that item 7 is an insulator.

The first paragraph of the English-language Abstract describes that an elastic element 6 (Figure 1 of Nozick) is connected to a conductor 2 and is initially separated from conductors 3 and 4. Figure 1 appears to be a side-view and Figure 2 appears to be a top-view (or vice versa). This can be seen where item 62 is shown in cross-section in Figure 1 and is shown in top-view in Figure 2. While the H-shaped items in Figure 1 are not identified, by observing Figure 2, the H-shaped items are clearly cross-section portions of the U-shaped structures 7. More specifically, the H-shaped items in Figure 1 are positioned below the elastic portion 62. The same portions are shown from the different perspective as items 71' and 72' in Figure 2. Therefore, Appellants submit that

the relative positions of the structures shown in Figures 1 and 2 demonstrate that the H-shaped items in Figure 1 are portions of the U-shaped structure shown in Figure 2.

As described in the last paragraph of the English-language abstract, when there is an over-voltage condition, the insulating wedge melts allowing the arms 62, 63 to move down and provide a short circuit of element 2 to the conductors 3, 4. As described above, the relative positions of the structure shown in Figures 1 and 2 demonstrate that the H-shaped items in Figure 1 are portions of the U-shaped structure shown in Figure 2. Since it is the H-shaped structures that must melt to allow the ends of members 6 to contact conductors 3 and 4, the U-shaped structure 7 must be the U-shaped insulating wedge described in the English-language abstract.

This is directly contrary to the invention defined by independent claims 1, 8, and 25. More specifically, independent claims 1, 8, and 25 each define "an inverse-U shaped fuse . . . wherein said fuse comprises a continuous conductive element." In Nozick the element 7 is designed to melt and create a short-circuit when an over-voltage condition exists (see English-language abstract). The invention is directly contrary to such a structure. Instead, the claimed invention includes a conductive fuse that is designed to melt and prevent an electrical connection when an over-voltage condition exists. Therefore, Appellants submit that Nozick actually teaches away from the claimed invention because Nozick teaches that the exact opposite reactions should occur during a certain set of conditions when compared to the reaction created by the invention. Therefore, one ordinarily skilled in the art would not have made reference to the teachings in Nozick when designing a fuse that breaks a circuit. Instead, only those interested in forming short circuits would have made reference to Nozick. Thus, Appellants submit that not only does Nozick not teach each and every element of the claimed invention as defined by independent claims 1, 8, and 25 (as required by 35 U.S.C. § 102) but further that Nozick would not have been referred to by one ordinarily skilled in the art because Nozick teaches away from the invention.

Thus, the U shape that is referred to in the Office Action is actually made of an insulator. Nozick does not disclose a metal fuse, rather, Nozick discloses melting an insulator supporting an "elastic element" 6 that will provide a short-circuit when an over voltage occurs. The claimed invention uses a conductor that forms an open circuit when desired. Appellants further note that the air gap that is below the insulating element in

Nozick is far a field from the Appellants' invention in that Nozick does not disclose a conductive fuse element. Further, Nozick has three electrodes (2, 3, and 4), a U-shaped insulating material 7, and an elastic element 6. Appellants disagree that this can constitute an integrated circuit. Also, the air gap mentioned in the Office Action does not exist under the conductors in Nozick. Instead, there is only a gap below the U-shaped insulator and under the elastic element.

In view of the forgoing, Appellants respectfully submit that Nozick does not teach or suggest "an inverse-U shaped fuse . . . wherein said fuse comprises a continuous conductive element," as defined by independent claims 1, 8, and 25. Therefore, these claims are not anticipated by Nozick and are allowable. In view of the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

**ii. The Independent Patentability of
Dependent Claims 6, 8, 10, 21, 22, 28,
and 29**

The following discussion demonstrates that Nozick does not teach or suggest the invention defined by the dependent claims, but also that the dependent claims are independently patentable over their associated independent claims and do not stand or fall with their associated independent claims.

Dependent claim 6 defines that a portion of the fuse is perpendicular to and above the insulator layer. Nozick cannot teach the structure because, as explained above, the U-shaped structure is not a conductive fuse, but instead is an insulator. Thus, Nozick is incapable of teaching one ordinarily skilled in the art that a portion of the conductive fuse would be perpendicular to and above the insulator layer. Therefore, dependent claim 6 is independently patentable over Nozick because of the features defined and because of its dependency from independent claim 1.

Dependent claims 7 and 10 define the interface wall that exists in the gap between the fuse and insulator. Once again, it is Appellants position that Nozick cannot teach or suggest this structure because it does not include an inverse-U-shaped conductive fuse that can form such an interface wall, but instead only discloses a U-shaped insulating structure. Therefore, it is Appellants' position that dependent claims 7 and 10 are

independently patentable over Nozick because of the additional features of the invention they define.

Dependent claims 21 and 22 define that a portion of the fuse is surrounded by air. Once again, this feature is also independently patentable over Nozick principally because Nozick does not provide the teaching of an exterior conductive fuse element that utilizes a gap that is surrounded by air. Instead, Nozick only discloses an insulating U-shaped structure. Therefore, dependent claims 21 and 22 are similarly independently patentable in their own right.

Dependent claim 28 defines a fuse that forms a circuit with the wiring elements and dependent claim 29 defines that wiring elements are internal to the integrated circuit structure and are separated from an external portion of the integrated circuit structure by the insulator layer. These features demonstrate how the invention is even further distinguished from Nozick because the insulating U-shaped structure in Nozick can never be part of a "circuit" because it is not conductive. Instead, the insulating U-shaped structure disclosed in Nozick is merely a physical feature that melts when the structure reaches a sufficient temperature.

Thus, Nozick does not teach or suggest the invention defined by dependent claims 6, 7, 10, 21, 22, 28, and 29; and, dependent claims 6, 7, 10, 21, 22, 28, and 29, are patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view of the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

2. The Rejection Based on Nozick in view of Clinton

a. The Position in the Office Action

Regarding claims 2-4, 9, and 30, the Office Action states the following:

Nozick discloses the device structure as recited in the claims, but does not specifically disclose an electroplated and electroless fuse element.

Clinton et al disclose (see figs. 1-8, col. 6, lines 11-50 and col. 12, lines 45-67) an electroplated fuse element. Therefore, it would have been to one skilled in the art at the time the invention was made to use an electroplated fuse

element, since that would provide the required resistivity and melting point necessary for a better fuse function.

Regarding claims 3, 4 and 9, Clinton et al. disclose electroplated/electroless plated fuse element (as in claim 3) having a thickness, which falls within 100 angstroms to 350 angstroms (as in claim 4).

b. Appellants' Position

**i. The Independent Patentability of
Dependent Claims 2-4, 9 and 30**

Clinton is referenced for the limited purpose of showing an electroplated fuse element. However, Appellants submit that Clinton is not properly combinable with Nozick because electroplating the U-shaped insulator in Nozick would make the U-shaped element a conductor, which would destroy the operability and function that the insulating U-shaped element performs. In other words, if the U-shaped element 7 were a conductor, it would create an unintended short circuit, in that it was intended to be used as an insulator. When a combination of references destroys the operability and function of one of the references, one ordinarily skilled in the art would not have made the combination. Therefore, Appellants submit that a prima facie case of obviousness has not been set forth because the proposed combination of references destroys the operability and function of Nozick by changing the insulator into a conductor.

Further, Clinton is not in the same art field as the inventive structure because Clinton requires that the fuse element be positioned within the insulator, while the invention relates to external fuses. The teachings regarding electroplating fuse elements in Clinton would be irrelevant to the claimed invention which includes external fuse elements. Clinton requires that the "fuses 50 are positioned in hollow cavities in the insulator 30" (Abstract, lines 8-10). Therefore, Clinton explicitly requires that the fuse element be positioned within the insulator 30. The invention is fundamentally different than the structure shown in Clinton and has the fuse positioned external to the insulator.

In addition, as shown above, Nozick actually teaches away from the claimed invention by creating a short circuit. Also, the teaching of melting the insulator in Nozick would destroy the function of the structure in Clinton because it would cause

short circuits in the structure in Clinton. Thus, Appellants submit that there is no motivation in either reference toward teaching any combination to form the invention and that a prima facie case of obviousness has not been set forth.

More importantly, because Clinton requires that the fuse be internal to the circuit, it cannot teach or suggest the external, U-shape conductive fuse element defined by independent claims 1, 8, and 25. Therefore, any combination of Clinton and Nozick would not teach one ordinarily skilled in the art the claimed features of an "inverse-U shaped fuse . . . wherein said fuse comprises a continuous conductive element," as defined by independent claims 1, 8, and 25. Therefore, the independent claims in the application are patentable over the applied prior art of record.

In addition, dependent claims 2-4, 9, and 30 are patentable not only because they depend from a patentable independent claim, but also because of the additional features of the invention they define. More specifically, dependent claims 2, 3, 9, and 30 define that the fuse is plated (electroplated or electroless plated). Dependent claim 4 defines a specific size limitation of the invention. The only type of electroplating discussed in the prior art of record (Clinton) relates to internal fuse structures and not to the claimed external conductive fuse structure. Therefore, there is no teaching or suggestion in the prior of record of the claimed electroplated or electroless plating of external conductive fuse elements. Thus, dependent claims 2-4, 9, and 30 are independently patentable in their own right.

Therefore, Appellants respectfully traverse this rejection on the basis that a prima facie case of obviousness has not been set forth because the applied references are not properly combinable since the teachings are essentially unrelated. Further, the applied references do not teach or suggest the claimed invention. Since this rejection is defective, Appellants respectfully request that it be withdrawn and that dependent claims 2-4, 9 and 30 be passed to issue. In view the forgoing, the Board is respectfully requested to reconsider and withdraw this rejection.

IX. CONCLUSION

The claimed invention comprises a conductive inverse-U-shaped fuse, a portion of which is positioned external to the insulator. The structure is clearly illustrated in

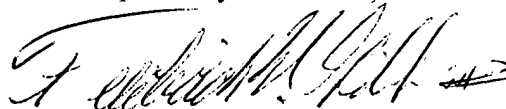
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Appellants' Figure 1 where the fuse element 130 includes horizontal fuse element 140 with a pair of fuse electrodes 150, 151 extending downward from the horizontal fuse element 140 into the insulator layer 115. This structure allows the fuse to be blown by applying a laser or exterior etching (or electrical current). When the fuse blows, the fuse debris material remains outside the insulator layer, thereby preventing any fuse debris contamination.

The claims define this structure very clearly. For example, independent claim 1 defines an "inverse-U shaped fuse extending through said insulator layer . . . wherein a portion of said fuse is positioned external to said insulator . . . and wherein said fuse comprises continue as conductive element." The main applied prior art reference (Nozick) only teaches the use of a U-shaped insulator that melts to create a short circuit and does not teach or suggest the claimed U-shape fuse element that comprises a "continuous conductive element", and Clinton also does not teach or suggest any type of U-shaped element.

In view the forgoing, the Board is respectfully requested to reconsider and withdraw the rejections. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0458.

Respectfully submitted,



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APPENDIX

1. A fuse structure comprising:
an insulator layer; and
an inverse-U shaped fuse extending through said insulator layer to an underlying wiring layer,
wherein a portion of said fuse is positioned external to said insulator, with a gap juxtaposed between said insulator and said portion of said fuse, and
wherein said fuse comprises a continuous conductive element.
2. The fuse structure in claim 1, wherein said portion of said fuse is electroplated.
3. The fuse structure in claim 1, wherein said portion of said fuse is electroless plated.
4. The fuse structure in claim 1, wherein said fuse has a thickness in range of 100 angstroms to 350 angstroms.
5. (Cancelled).
6. The fuse structure in claim 1, wherein said portion of said fuse is perpendicular to and above said insulator layer.
7. The fuse structure in claim 1 further comprising an interface wall, wherein said interface wall further comprises a first side wall, a second side wall, and an inner wall, wherein said inner wall is disposed within said gap.
8. A fuse structure comprising:
an insulator layer; and
an inverse-U shaped fuse extending through said insulator layer to an underlying wiring layer,
wherein a portion of said fuse is positioned external to said insulator,

wherein said portion of said fuse is perpendicular to and above said insulator layer, and

wherein said fuse comprises a continuous conductive element.

9. The fuse structure of claim 8, wherein said portion of said fuse is one of electroplated and electroless plated.

10. The fuse structure in claim 8 further comprising an interface wall, wherein said interface wall further comprises a first side wall, a second side wall, and an inner wall.

11 - 20. (Cancelled).

21. The fuse structure in claim 1, wherein said portion of said fuse is surrounded by air.

22. The fuse structure in claim 8, wherein said portion of said fuse is surrounded by air.

23. (Cancelled).

24. (Cancelled).

25. An integrated circuit structure comprising:
a wiring layer having wiring elements;
an insulator layer covering said wiring layer; and
an inverse U-shaped fuse extending completely through said insulator layer and being connected to said wiring elements,

wherein said insulator layer forms an external surface of said integrated circuit structure and a portion of said fuse extends beyond said external surface, and

wherein said fuse comprises a continuous conductive element.

26. (Cancelled).

27. (Cancelled).
28. The integrated circuit structure in claim 25, wherein said fuse forms a circuit with said wiring elements.
29. The integrated circuit structure in claim 25, wherein said wiring elements are internal to said integrated circuit structure and are separated from an external portion of said integrated circuit structure by said insulator layer.
30. The integrated circuit structure in claim 25, wherein said portion of said fuse is plated.